

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A membrane electrochemical generator (1, 100, 200), comprising:

a multiplicity of reaction cells (2, 201),

each said reaction cell ~~[[having]]~~ comprises an anodic chamber ~~[[9]]~~ and a cathodic chamber ~~[[10]]~~ separated by a proton exchange membrane (4, 204) ~~wherein gaseous reactants react,~~

each said reaction cell is delimited by a pair of conductive bipolar plates (3, 203), so that one of said pair of conductive bipolar plate is adjacent to the anodic chamber and the other of said pair of conductive bipolar plate is adjacent to the cathodic chamber, and

at least one of said pair of conductive bipolar plates (3, 203) [[have]] comprises a multiplicity of fluid injection calibrated holes (20, 230), wherein one end of the calibrated hole opens to a source of water on one side of said conductive bipolar plate and the other end of the calibrated hole opens to an adjacent chamber on the other side of said conductive bipolar plate, so that the water flows from one side of the bipolar plate through the calibrated hole to the adjacent chamber for the injection of a calibrated flow of a cooling fluid into said reaction cell (2, 201),

said anodic chamber ~~[[9]]~~ and said cathodic chamber ~~[[10]]~~ each has an electrically conductive reticulated element (7, 206),

wherein the reticulated element is a tridimensional network of wires that electrically ~~[[connecting]]~~ connects the conductive bipolar plates to the electrode ~~while simultaneously distributing~~ and distributes the gaseous reactants in the anodic chamber or the cathodic chamber where the reticulate material resides.

2. (Currently Amended) A generator of claim 1, wherein ~~said calibrated flow of~~ said cooling fluid partially evaporated inside the reaction cell, humidifying said gaseous reactants inside the reaction cell and removing heat generated in the reaction from said membrane electrochemical generator ~~(1, 100, 200).~~

3. (Currently Amended) A generator of claim 1, wherein said fluid injection calibrated holes ~~(20, 230)~~ are mutually aligned and placed in correspondence of feed openings ~~(12, 13, 208a₁, 208a₂)~~ for the passage of feeding said gaseous reactants, and of side openings ~~(16, 209)~~ for the passage of feeding said cooling fluid ~~(12, 13, 208a₁, 208a₂),~~

wherein said side openings ~~(16, 209)~~ are in a perimetrical portion ~~(11, 208)~~ of said conductive bipolar plates ~~(3, 203).~~

4. (Currently Amended) A generator of claim 1, wherein said fluid injection calibrated holes ~~(20, 230)~~ have the same diameter, said diameter is between 0.2 mm to 1 mm.

5. (Currently Amended) A generator of claim 1, wherein said conductive bipolar plates ~~[(3)]~~ are interposed between an anodic sealing gasket ~~[(8a)]~~ and a cathodic sealing gasket ~~[(8b)]~~ from two adjacent reaction cells ~~[(2)]~~,

said sealing gaskets ~~(8a, 8b)~~ comprise:

a hollow center portion wherein an electrically conductive reticulated element ~~(7)~~ resides,

feed openings ~~(8a₁, 8a₂, 8b₁, 8b₂)~~ for the passage of said gaseous reactants;

side openings ~~(8a₅, 8b₅)~~ for the passage of said cooling fluid; and

distribution channels ~~(21a, 23a)~~ to fluidly connect said feed openings ~~(8a₁, 8a₂, 8b₁, 8b₂)~~ to said electrically conductive reticulated element ~~(7)~~.

6. (Currently Amended) A generator of ~~[[clam]]~~ claim 5, wherein at least one of said sealing gaskets ~~(8a, 8b)~~ comprises fluid collection channels ~~[(22)]~~ connected to said side openings ~~(8a₅, 8b₅)~~,

said fluid collection channels ~~[(22)]~~ are interposed between said feed openings ~~(8a₁, 8a₂, 8b₁, 8b₂)~~ and said distribution channels ~~(21a, 23a)~~ to collect said cooling fluid.

7. (Currently Amended) A generator of claim 5, wherein at least one of said sealing gaskets ~~(8a, 8b)~~ comprises fluid collection channels ~~[(22)]~~ connected to said side openings ~~(8a₅, 8b₅)~~ and to said distribution channels ~~(21a, 23a)~~,

said fluid collection channels ~~[(22)]~~ are located between said feed openings ~~(8a₁, 8a₂, 8b₁, 8b₂)~~ and said distribution channels ~~(21a, 23a)~~.

8. (Currently Amended) A generator of claim 6, wherein in a filter-press configuration said fluid collection channels ~~[(22)]~~ present on at least one of the sealing gaskets ~~(8a, 8b)~~ are superposed to said fluid injection calibrated holes ~~[(20)]~~ and that each of said fluid injection calibrated holes ~~[(20)]~~ is in correspondence of a distribution channel ~~(21a, 23a)~~ obtained on the other sealing gasket ~~(8a, 8b)~~.

9. (Currently Amended) A generator of claim 1, comprising a multiplicity of cooling cells ~~[(101)]~~, each of the cooling cells ~~[(101)]~~ being interposed between two reaction cells ~~[(2)]~~,

said cooling cell further comprises:

a perimetrical portion ~~[(102a)]~~ having a central hollow portion ~~[(102b)]~~, side openings ~~[(104)]~~ for the passage of said cooling fluid, at least one fluid collection channel ~~[(106)]~~ connected to said side openings ~~[(104)]~~, feed openings ~~(103a₁, 103a₂)~~ for the passage of said gaseous reactants, and discharge openings ~~(103b₁, 103b₂)~~ for discharging the reaction products and residual reactants; and

an electrically conductive reticulated element residing in the central hollow portion ~~[(102b)]~~.

10. (Currently Amended) A generator of claim 9, wherein said fluid collection channel ~~(106)~~ is located between said feed openings ~~[(103a₁, 103a₂)]~~ and said hollow central portion ~~(102b)~~.

11. (Currently Amended) A generator of claim 9, wherein in a filter-press configuration said fluid collection channel ~~(106)~~ is superposed to said fluid injection calibrated holes ~~(20)~~ of said conductive bipolar plates ~~(3)~~.

12. (Currently Amended) A generator of claim 9,
wherein a side channel ~~107 and/or 108~~ fluidly connect the side opening ~~(104)~~ with the hollow central portion ~~[(102a)]~~.

13. (Currently Amended) A generator of claim 12, wherein said cooling fluid traverses the cooling cell prior to crossing said fluid injection holes ~~[(20)]~~ into ~~[(the)]~~ at least one adjacent reaction cell, pre-heating counter-currently or concurrently with respect to at least one gaseous flow entering said reaction cells ~~[(2)]~~.

14. (Currently Amended) A generator of claim 1, wherein said conductive bipolar plates ~~[(203)]~~ comprise a multiplicity of first calibrated holes ~~[(213a)]~~ for the passage of said gaseous reactants and a multiplicity of second calibrated holes ~~[(213b)]~~ for the discharge of reaction products and of optional residual reactants,
and that said multiplicity of fluid injection calibrated holes ~~[(230)]~~ are placed in correspondence of said multiplicity of first calibrated holes ~~[(213a)]~~.

15. (Currently Amended) A generator of claim 14, wherein said first calibrated holes ~~[(213a)]~~ are mutually aligned and placed in correspondence of ~~[(said)]~~ feed openings ~~(208a₁, 208a₂)~~ of ~~[(said)]~~ conductive bipolar plates ~~[(203)]~~, and that said

second calibrated holes ~~[(213b)]~~ are mutually aligned and placed in correspondence of discharge openings ~~(208b₁, 208b₂)~~ on said perimetrical portion ~~[(208)]~~ of said conductive bipolar plates ~~[(203)]~~.

16. (Currently Amended) A generator of claim 14, wherein said reaction cells ~~[(201)]~~ comprise a sealing gasket ~~[(207)]~~ covering only one face of said perimetrical portion ~~[(208)]~~ of said conductive bipolar plates ~~[(203)]~~, said sealing gasket ~~[(207)]~~ having a central hollow portion wherein an electrically conductive reticulated element ~~[(206)]~~ resides.

17. (Currently Amended) A generator of claim 14, comprising:
a multiplicity of cooling cells ~~[(202)]~~, each of the cooling cells ~~[(202)]~~ being interposed between two reaction cells ~~[(201)]~~ and comprising a rigid perimetrical portion ~~[(202a)]~~ and a hollow central portion ~~[(202b)]~~, said rigid perimetrical portion ~~[(202a)]~~ separates said gaseous reactants from said hollow central portion ~~[(202b)]~~ an electrically conductive reticulated element ~~[(206)]~~ resides.

18. (Currently Amended) A generator of claim 17, wherein said rigid perimetrical portion ~~[(202a)]~~ has feed openings ~~(214a₁, 214a₂)~~ for feeding said gaseous reactants, discharge openings ~~(214b₁, 214b₂)~~ for discharging the reaction products and the residual reactants, and side openings ~~[(215)]~~ for the passage of said cooling fluid.

19. (Currently Amended) A generator of claim 17, wherein said rigid perimetrical portion ~~[(202a)]~~ is covered on each face by a gasket ~~[(217)]~~, said gasket ~~[(217)]~~ defining on each face of said rigid perimetrical portion ~~[(202a)]~~

a zone for collecting the gaseous reactants ~~[(218a)]~~ fluidly connects with said feed openings ~~(214a₁, 214a₂)~~ of said rigid perimetrical portion ~~[(202a)]~~ through a feed channel ~~[(219)]~~, and

a zone for collecting the reaction products and ~~[(of)]~~ the residual reactants ~~[(218b)]~~ fluidly connects with said discharge openings ~~(214b₁, 214b₂)~~ of said rigid perimetrical portion ~~[(202a)]~~ through a discharge channel ~~[(220)]~~.

20. (Currently Amended) A generator of claim 19 wherein said gasket ~~[(217)]~~ seals said zone for collecting the gaseous reactants ~~[(218a)]~~ and said zone for collecting the reaction products and ~~[(of)]~~ the residual reactants ~~[(218b)]~~ so as to hinder the passage of said gaseous reactants and of said reaction products and optionally residual reactants within said cooling cell ~~[(202)]~~.

21. (Currently Amended) A generator of claim 19, wherein in a filter-press configuration said zone for collecting the gaseous reactants ~~[(218a)]~~ is superposed to said first calibrated holes ~~[(213a)]~~ and said zone for collecting the reaction products and the residual reactants ~~[(218b)]~~ is superposed to said second calibrated holes ~~[(213b)]~~.

22. (Currently Amended) A generator of claim 19, wherein said fluid injection calibrated holes ~~[[230]]~~ are located below said first calibrated holes ~~[[213a]]~~ and that said gasket ~~[[217]]~~ defines on each face of said rigid perimetrical portion ~~[[202a]]~~ a fluid collection channel ~~[[221]]~~ placed below said feed openings ~~(214a₁, 214a₂)~~ of said cooling cells ~~[[202]]~~.

23. (Currently Amended) A generator of claim 19, wherein said fluid injection calibrated holes ~~[[230]]~~ located between said feed openings ~~(208a₁, 208a₂)~~ of said bipolar plates ~~[[203]]~~ and said first calibrated holes ~~(113a, 113b)~~, and

that said gasket ~~[[217]]~~ defines on each face of said rigid perimetrical portion ~~[[202a]]~~ a fluid collection channel ~~[[221]]~~ located between said feed openings ~~(214a₁, 214a₂)~~ of said cooling cell ~~[[202]]~~ and said zone for collecting the gaseous reactants ~~[[118a]]~~.

24. (Currently Amended) A generator of claim 22, wherein in a filter-press configuration said fluid collection channel ~~[[221]]~~ is superposed to said fluid injection calibrated holes ~~[[230]]~~.

25. (Currently Amended) A generator of claim 19, wherein said cooling cells ~~[[202]]~~ comprise a first and a second fluid collection lateral channel ~~(222, 223)~~ connected to said side openings ~~[[215]]~~ of said cooling cells ~~[[202]]~~ and placed above said discharge openings ~~(214b₁, 214b₂)~~ of said cooling cells ~~[[202]]~~, and

that said cooling fluid, prior to reaching said fluid injection holes ~~[(230)]~~, passes through said first and second fluid collection lateral channels ~~(222, 223)~~ to cross subsequently the whole surface of said electrically conductive reticulated element ~~[(206)]~~, pre-heating counter-currently or concurrently with respect to at least one gaseous flow entering said reaction cells ~~[(201)]~~.

26. (Currently Amended) A generator of claim 19, wherein said cooling cells ~~[(202)]~~ comprise:

a first and a second fluid collection lateral channel ~~(224, 225)~~ connected to said side openings ~~[(215)]~~ of said of said cooling cells ~~[(202)]~~ and placed above said discharge openings ~~(214b₁, 214b₂)~~ of said additional cells ~~[(202)]~~;

a third and a fourth fluid collection lateral channel ~~(226, 227)~~ connected to said side openings ~~[(215)]~~ of said cooling cells ~~[(202)]~~ and placed below said feed openings ~~(214a₁, 214a₂)~~ of said cooling cells ~~[(202)]~~;

a fluid collection channel ~~[(221)]~~ located between said feed openings ~~(214a₁, 214a₂)~~ of said cooling cells ~~[(202)]~~ and said zone for collecting the gaseous reactants ~~[(218a)]~~ and connected to said side openings ~~[(215)]~~ of said cooling cells ~~[(202)]~~;

said cooling fluid, prior to reaching said fluid injection holes ~~[(230)]~~ enters through said first and second fluid collection lateral channel ~~(224, 225)~~ to subsequently cross the whole surface of said electrically conductive reticulated element ~~[(206)]~~, pre-heating counter-currently or concurrently with respect to at least one gaseous flow entering said reaction cells ~~[(201)]~~, wherein said cooling fluid subsequently exiting from said third and fourth fluid collection lateral channel ~~(226, 227)~~; and

in a filter-press configuration said fluid collection channel [(221)] is superposed to said fluid injection calibrated holes [(230)].

27. (Previously Presented) A generator of claim 1, wherein said cooling fluid is liquid water.

28. (Canceled)